

THE MINERAL INDUSTRY OF

CHAD

By Philip M. Mobbs

In 2000, minerals production in the Republic of Chad included about 120 kilograms of gold produced from alluvial placer deposits in the Mayo Kebbi area by artisanal miners. About 300,000 metric tons (t) of construction materials, which included aggregate from the Mani quarry at Dandi and gravel, sand, and silt from the Chari and the Logone Rivers, were produced. Clay was mined from numerous pits to manufacture brick. Limestone was recovered from the Louga quarry for local lime kilns.

Approximately 12,000 t of natron (soda ash) was recovered from Lake Chad south and east of Liwa. About 9,000 t of salt was mined from various locations (Mining Journal, 2000; European Union, 1998, Chad—Section 4—Geology and mineral deposits, Country Profile, accessed August 25, 1998, at URL <http://www.mines98.com/country/td/index.htm>).

The mineral industry was becoming an increasingly significant segment of Chad's economy. Although overall mineral production was negligible in 2000, the 20-year hiatus in the commercial exploitation of the country's petroleum resources began to close in June when the World Bank approved a \$93 million loan to finance the Government's interest in the development of the Doba Basin and the export pipeline programs (World Bank, 2000).

In 1999 (the last year for which data are available), the gross domestic product (GDP) for the country was estimated to be \$1.5 billion, and GDP per capita was estimated to be \$200 (U.S. Department of State, 2000, p. 59). Chad's economy was largely based on agriculture, which accounted for about 40% of the GDP (Plant and others, 1999, p. 7). The nation's industrial sector suffered from low energy availability, high energy prices, and geographic and infrastructural isolation (U.S. Department of State, 2000, p. 4). In 2000, the economy continued to be affected by fuel supply and transportation problems (International Monetary Fund, July 6, 2000, Memorandum of economic and financial policies, accessed April 6, 2001, at URL <http://www.imf.org/external/np/loi/2000/tcd/01/index.htm>).

Chad's foreign trade essentially depended upon cotton, which accounted for about 65% of the foreign currency earnings of the country. The Government indicated that it would like to diversify the economy to alleviate the vulnerability associated with international market price oscillations for a single-export commodity. Adding petroleum to the country's exports would provide some diversification. In 1998 (the last year for which data are available), total exports were valued at \$269 million. Fuel imports accounted for about 10% of total imports valued at \$454 million. Construction material imports, such as cement, accounted for 6% of total imports, and unofficial estimates placed fertilizer imports about 3% of total imports (U.S. Department of State, 2000, p. 25, 27; World Bank, September 7,

2000, Chad at a glance, accessed September 20, 2000, at URL http://www.worldbank.org/data/countrydata/aag/tcd_aag.pdf).

Chad's legal system was based on French civil law and Chadian traditional law. There was a 45% corporate profit tax and a negotiable mining tax levied on the volume of material produced (Plant and others, 1999, p. 106; U.S. Department of State, 2000, p. 39, 45). Law No. 001/pr/99 addressed the management of oil revenues from the Doba Basin.

The Government proposed to compile an inventory of mineral resources. The Korea International Cooperation Agency was funding a study of mineral deposits in the Mayo-Kebbi region. Deposits of bauxite near Guidara; columbium (niobium)-tantalum in the Tibesti region; diatomite at Faya Largeau and at Koro Toro; graphite at Gabil and near Waya Waya; kaolin near Kelo and near Abou Déia; limestone near Baoaré and in the north; marble at Dolko, Teubara, and in the Ouaddaï region; silica sand; soapstone near Léré; and tin and tungsten in the Tibesti region were reported, as were indications of chromite, copper, geothermal energy, iron, lead, nickel, radioactive minerals, titanium, and zinc deposits. Overall, Chad was relatively unexplored; any exploration activities in the near future, however, would be hampered by the rebellion in the north and by the presence of antitank and antipersonnel mines in the Borkou-Ennedi-Tibesti, the Guera, the Moyen Chari, and the Salamat regions (Mining Journal, 2000; U.S. Department of State, 2000, p. 7, 10; Direction de Recherches Géologiques et Minières, written commun., [undated]; European Union, 1998, Chad—Section 4—Geology and mineral deposits, (Country Profile), accessed August 25, 1998, at URL <http://www.mines98.com/country/td/index.htm>).

In 2000, two petroleum development projects were in progress. Chad's recoverable crude oil resources were estimated to be 1 billion barrels, most of which were in the Doba Basin (U.S. Energy Information Administration, February 2000, Chad—Energy overview, Country Analysis Briefs, accessed November 2, 2000, at URL <http://www.eia.doe.gov/emeu/cabs/chad.html>).

Chadian oil resources in the Doba Basin have not been developed because of the limited local market demand and the lack of pipeline transport to the international market (Esso Exploration and Production Chad, Inc., [undated], The Project—Exploration history and background, accessed September 19, 2000, at URL <http://www.essochad.com/eaff/essochad/documentation/summary/2.html>).

In April, Petroliaam Nasional Bhd. (35% equity interest) and Chevron Overseas Petroleum Inc. (25%) joined Esso Exploration and Production Chad Inc. (EssoChad) (40%) in a consortium that would develop the Bolobo, the Komé, and the Miandoum Fields

in the Doba Basin. Société Shell Tchadienne de Recherches et d'Exploitation and Elf Hydrocarbures Chad had withdrawn from the project in 1999. On June 6, the World Bank approved financial support for the \$3.7 billion development of the Doba Basin petroleum resources and the Chad-Cameroon pipeline project. In addition to the World Bank's \$93 million loan to the Government, the International Finance Corp., which was an affiliate of the World Bank, was to provide a \$100 million loan to the pipeline companies and was to compile \$300 million in syndicated loans. The International Development Association, which was an affiliate of the World Bank, was providing \$23.7 million to support Chad's environmental management and monitoring activities (World Bank, 2000). On October 18, 2000, ground was broken for the 1,070-kilometer (km), 760-millimeter (mm)-diameter Chad-Cameroon export pipeline. The pipeline was projected to carry crude oil for 25 to 30 years at volumes that could reach 225,000 barrels per day (bbl/d), or 575 million metric tons per year (Esso Exploration and Production Chad, Inc., [undated], Section 1—Project overview, Supporting Documents, accessed April 7, 2001, via URL http://www.essochad.com/eaff/essochad/documentation/english/sd_v1_toc.html). The export pipeline project continued to be controversial (Africa Energy Intelligence, 2000; Harry Dunphy, Associated Press, June 5, 2000, Africa oil project under fire, accessed June 5, 2000, at URL http://biz.yahoo.com/ap/000605/world_bank.html); Environmental Defense Fund, [undated], The Chad Cameroon oil and pipeline project—Putting people at risk, accessed June 28, 2000, at URL <http://www.edf.org/pubs/reports/chadcameroon/index.html>).

The consortium planned to drill an additional 289 production wells and 26 water disposal wells in the fields. Produced natural gas was to fuel an on-site powerplant. Produced water was to be reinjected. Oil resources at Komé were estimated to be 588 million barrels (Mbbbl); at Miandoum, 227 Mbbbl; and at Bolobo, 135 Mbbbl. The American Petroleum Institute gravity of the crude ranged from 17 to 24 degrees, and sulfur, from 0.06 to 0.14 weight percent (Esso Exploration and Production Chad, Inc., [undated], Tables 2.1 and 2.2, Supporting Documents, accessed April 7, 2001, via URL http://www.essochad.com/eaff/essochad/documentation/english/sd_v1_toc.html).

The second petroleum project in Chad was the redevelopment of the Sedigui oilfield. Crude oil reserves at Sedigui were estimated to be 15 Mbbbl (Hueper, 1999; Africa Energy & Mining, 2000b). The \$95 million project included the redevelopment of the Sedigui oilfield and the laying of a 317-km, 100-mm-diameter pipeline from the field to a proposed oil refinery in N'Djamena. The new refinery capacity has been reported to be in the range of 3,000 to 5,000 bbl/d (Hueper, 1999; U.S. Department of State, 2000, p. 23). Concorp International Ltd. of Sudan was building the refinery that would have an refined product output of 1 million to 1.8 million barrels per year. In 1997 (the last year for which data are available), Chad imported about 630,000 barrels of petroleum products (Plant and others, 1999, p. 96). Excess fuel oil from the new refinery would be used to fire a new powerplant to be built in N'Djamena. The natural gas that will be produced at Sedigui was proposed as a fuel for additional electricity

generation or to process and bottle natural gas in the form of compressed natural gas instead of flaring the gas at the field (United Nations Development Programme, [undated], Global environment facility—Operations—Portfolio, accessed April 6, 2001, at URL <http://www.undp.org/gef/portf/climafr.htm>).

Charcoal and wood were the primary fuel sources in the country. Société Tchadienne d'Eau et d'Electricité (STEE) operated oil-fired electricity generation plants in Chad. The high cost of fuel imported from Cameroon and Nigeria resulted in high electricity costs. N'Djamena, which was the largest urban area in Chad, was approximately 1,400 km from Port Harcourt, Nigeria; 1,550 km from Douala, Cameroon; and 3,500 km from the port of Tripoli, Libya. Transportation costs made importation of fuel from Libya uneconomic (Plant and others, 1999, p. 90). The STEE's installed electricity generating capacity was 38 megawatts (MW), but actual generating capacity was significantly less, in part, because of the lack of capital investment (Elliot, 1991, p. 158; Plant and others, 1999, p. 10; U.S. Department of State, 2000, p. 22). Nationally, the adverse effects of frequent power failures were minimized because the STEE only served 6 of the country's 84 cities and towns (about 2% of the population of the entire country) (U.S. Department of State, 2000, p. 23; Ministry of Economic Promotion and Development, May 2000, National Poverty Reduction Strategy—Interim paper—Paragraph 53, accessed April 6, 2001, at URL <http://www.imf.org/external/np/prsp/2000/tcd/01/index.htm>). In January 2000, Vivendi Water and Dietsman of France entered a 2-year contract to manage the STEE with the option to lease the operation. EssoChad planned to construct a dedicated 120-MW-capacity powerplant to support its operations in the Doba Basin (Esso Exploration and Production Chad, Inc., [undated], Paragraph 4.1.9.1—Overview, Supporting Documents, accessed April 7, 2001, via URL http://www.essochad.com/eaff/essochad/documentation/english/sd_v1_toc.html). The Sedigui project reportedly included a 16-MW electricity generating plant to supplement power supplied to N'Djamena by the STEE (Africa Energy & Mining, 2000b).

Surface transportation in Chad was primarily over a road network, of which only about 300 km was paved; this includes about 40,000 km of seasonably passable roads and unimproved rural trails (Ministry of Economic Promotion and Development, May 2000, National Poverty Reduction Strategy—Interim paper—Paragraph 49, accessed April 6, 2001, at URL <http://www.imf.org/external/np/prsp/2000/tcd/01/index.htm>). Barge traffic was able to use the northward-flowing Chari and the Logone Rivers in the wet season for about 45 days per year (Esso Exploration and Production Chad, Inc., [undated], The Project—Section 5—Crude oil transportation alternatives, accessed September 19, 2000, at URL <http://www.essochad.com/eaff/essochad/documentation/summary/5.html>). There was no railway in Chad.

During the 30-year life of the Doba Basin project, Chad could earn up to \$2 billion depending on oil prices. By 2004, when crude oil exportation was scheduled to be underway, Government revenues were expected to increase by 45% to 50% from current 2000 levels that could encourage investment in the building, education, health, and transportation sectors (Africa

Energy & Mining, 2000a; World Bank, 2000).

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Major Sources of Information

- Direction de Recherche des Mines et de la Géologie
Ministère des Mines, de l'Energie et du Petrole
B.P. 906
N'Djamena, Chad
Telephone: +(235) 51-2-66
Fax: +(235) 51-5-330
- Direction de Petrole
Ministère des Mines, de l'Energie et du Petrole
B.P. 94
N'Djamena, Chad
Telephone: +(235) 52-38-50
Fax.: +(235) 52-25-65